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NOTICE.

The following pages form part of the Proceedings of the Thirteenth Annual Meeting of the North Central Association of Colleges and Secondary Schools. The price of this volume of the Proceedings entire is twenty-five cents. The price of the Appendix, printed separately, is ten cents. Copies of either may be obtained by addressing the Treasurer of the Association, Principal J. E. Armstrong, Englewood High School, Chicago.

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2-18-31

THE COMMISSION ON ACCREDITED SCHOOLS AND COLLEGES.

The Commission on Accredited Schools of the North Central Association of Colleges and Secondary Schools was organized at the Sixth Annual Meeting of the Association held in Chicago in March, 1901.

The first annual report* of the Commission was adopted by the Association March 28th, 1902. The duty of preparing a list of accredited schools was assigned to a committee of the Commission known as the Board of Inspectors. The Board prepared its first list of schools in 1904. The list is revised yearly and printed at the time of the Annual Meeting of the Association. In 1906 standing committees, consisting of two members from each of the states, one representing the college and the other the secondary school, were appointed on definitions of units, to make such revisions and additions as may, from time to time, be necessary. At the same time the name of the Commission was changed to read "The Commission on Accredited Schools and Colleges," and the Commission was instructed to report at the next annual meeting on the advisability of adopting a plan for the inspection of colleges and universities and the standardizing of their work. A committee of the Commission consisting of the Chairman, the Vice-Chairman, and the Secretary, was appointed to prepare and present to the Commission a plan for inspecting and accrediting colleges. A report of the committee was presented in 1908, and the Association voted that the Commission should undertake the work of inspecting and accrediting colleges and universities, but the plan presented was referred back to the Commission for further consideration.

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*Printed in the Proceedings of the Seventh Annual Meeting of the Association, also separately as an Appendix.

The Commission, as now constituted, is as follows:

OFFICERS.

Chairman, President George E. MacLean, Iowa State University.

Vice-Chairman, President James H. Baker, University of Colorado.

Secretary, Director George N. Carman, Lewis Institute, Chicago.

APPOINTED FOR 1906-1909.

President Harry Pratt Judson, University of Chicago.
Professor E. O. Holland, Indiana University.
Superintendent A. F. Nightingale, Chicago.
Principal George W. Benton, Shortridge High School, Indianapolis.

APPOINTED FOR 1907-1910.

President James H. Baker, University of Colorado.
Professor F. G. Hubbard, University of Wisconsin.
Inspector A. S. Whitney, University of Michigan.
Principal E. L. Harris, Central High School, Cleveland.

APPOINTED FOR 1908-1911.

President George E. MacLean, State University of Iowa.
President John R. Kirk, Normal School, Kirksville, Mo.
Director George N. Carman, Lewis Institute, Chicago.
Principal F. L. Bliss, University School, Detroit.

ADDITIONAL MEMBERS.

A delegate member may be appointed by each college or university belonging to the Association which has a freshman class of at least fifty members. The chair shall also appoint a sufficient number of members from the secondary schools to maintain a parity of representation as between the secondary schools and the colleges.

At a meeting of the Commission held immediately after the adjournment of the Association, March 28, 1908, the following committees were appointed:

Committee on Standards of Colleges and Universities: President MacLean, President Baker, Director Carman, President King of Cornell College, Iowa, and Principal Bliss, of Detroit University School.

Committee on Definition of Units: Principal Harris of Cleveland Central High School, President Hughes of Ripon College, Inspector Aiton of Minnesota, Principal Benton of Shortridge High School, Indianapolis, and Director Carman.

DEFINITIONS OF UNIT COURSES OF STUDY.

UNIT COURSES IN GENERAL.

1. A unit course of study is defined as a course covering a school year of not less than thirty-six weeks, with four or five periods of at least forty-five minutes each per week.

2. The graduation requirement of the high school and the entrance requirement of the college shall include fifteen units as above defined.

3. All high school curricula and all requirements for college entrance shall include as constants three units of English and two units of mathematics.

COLLEGE CREDIT FOR WORK DONE IN SECONDARY SCHOOLS.

1. The Commission favors the general principle that colleges should give advanced credit for secondary school work, when sufficient in amount and quality, done in addition to the fifteen units required for admission.

2. In the opinion of the Commission no advanced college credit should be given for less than one full year of secondary school work in any subject, except so far as half units are specified in the definitions of unit courses, or for any study that is not pursued later than the second year of the high school course.

3. The amount of advanced credit to be awarded in any subject should be determined by the college which the student enters.

UNIT COURSES IN PARTICULAR SUBJECTS.

ENGLISH.

COMMITTEE.

F. N. Scott (Chairman), Professor of Rhetoric, University of Michigan.

J. V. Denney, Professor of English and Dean of the College of Arts, Philosophy, and Science, Ohio State University.

J. W. McLane, Principal Lincoln High School, Cleveland, Ohio.

T. A. Clark, Professor of Rhetoric and Dean of Undergraduates, University of Illinois.

H. E. Giles, Principal, High School, Kewanee, Illinois.

W. F. Webster, Principal, East High School, Minneapolis, Minnesota.

H. M. Belden, Professor of English, University of Missouri.

E. M. Hopkins, Professor of Rhetoric and English Language, University of Kansas.

W. W. Stoner, Superintendent of City Schools, York, Nebraska.

F. G. Hubbard, Professor of the English Language, University of Wisconsin.

H. E. Coblentz, Head of the Department of English, South Division High School, Milwaukee, Wisconsin.

W. L. Cochrane, Superintendent of City Schools, Aberdeen, South Dakota.

C. F. Ansley, Professor of English, State University of Iowa.

G. P. Koebel, Teacher of English in High School, Clinton, Iowa.

B. F. Kizer, Director of English, Manual Training High School, Kansas City, Missouri.

E. S. Parsons, Dean of Department of Liberal Arts, Colorado College.

W. M. Shafer, Superintendent of Schools, Cripple Creek, Colorado.

Definitions (3 units).

The three units in English should cover the following subjects:

(a) *Grammar.* The student should have a sufficient knowledge of English grammar to enable him at need to point out the syntactical structure of any sentence which he encounters in the prescribed reading. He should also be able to state intelligently the leading grammatical principles when he is called upon to do so. Whether this knowledge is obtained in the elementary school and the secondary school combined or only in the elementary school is immaterial, provided the student have it; but in most cases it cannot be acquired except through regular study and practice in the lower grades and occasional reviews in the higher, and scarce through these. A progressive and regular development of the grammar-sense from the lowest grades to the highest is much to be preferred to a sudden and unprepared-for injection of formal grammar at a particular stage, as, for example, in the eighth grade.

(b) *Reading.* The books prescribed by the Joint Committee on Uniform Entrance Requirements in English form the basis for this part of the work. It is expected that all students shall read these books intelligently and appreciatively, but it is important to understand that the list is prescribed neither as a maximum nor as a minimum requirement. Rather these books are intended to serve as a common center from which each school shall proceed with such wider courses of English study as it may find profitable. It is taken for granted that each school will arrange for a considerable amount of outside reading supplementary to the prescribed readings.

The list, as arranged by the Joint Committee on Entrance Requirements in English, is divided into two parts, the first consisting of books to be read with attention to their contents rather than to their form, the second consisting of books to be studied thoroughly and minutely. The lists, thus divided, are as follows:

I. BOOKS PRESCRIBED FOR READING.

For 1909, 1910, and 1911 ten books, selected as prescribed below from the following list:

Group I (two to be selected).

Shakespeare's *As You Like It, Henry V, Julius Cæsar, The Merchant of Venice, Twelfth Night.*

Group II (one to be selected).

Bacon's *Essays;* Bunyan's *The Pilgrim's Progress, Part I; The Sir Roger de Coverly Papers* in the Spectator; Franklin's *Autobiography.*

Group III (one to be selected).

Chaucer's *Prologue;* Selections from Spenser's *Færie Queene;* Pope's *The Rape of the Lock;* Goldsmith's *The Deserted Village;* Palgrave's *Golden Treasury (First Series), Books II and III,* with especial attention to Dryden, Collins, Gray, Cowper and Burns.

Group IV (two to be selected).

Goldsmith's *The Vicar of Wakefield;* Scott's *Ivanhoe, Quentin Durward;* Hawthorne's *The House of the Seven Gables;* Thackeray's *Henry Esmond;* Mrs. Gaskell's *Cranford;* Dickens' *A Tale of Two Cities;* George Eliot's *Silas Marner;* Blackmore's *Lorna Doone.*

Group V (two to be selected).

Irving's *Sketch Book;* Lamb's *Essays of Elia;* De Quincey's *Joan of Arc* and *The English Mail Coach;* Carlyle's *Heroes and Hero Worship;* Emerson's *Essays* (Selected); Ruskin's *Sesame and Lilies.*

Group VI (two to be selected).

Coleridge's *The Ancient Mariner;* Scott's *Lady of the*

Lake; Byron's *Mazeppa* and *The Prisoner of Chillon;* Palgrave's *Golden Treasury* (*First Series*), *Book IV,* with special attention to Wordsworth, Keats and Shelley; Macaulay's *Lays of Ancient Rome;* Poe's *Poems;* Lowell's *The Vision of Sir Launfal;* Arnold's *Sohrab and Rustum;* Longfellow's *The Courtship of Miles Standish;* Tennyson's *Gareth and Lynette, Lancelot and Elaine,* and *The Passing of Arthur;* Browning's *Cavalier Tunes, The Lost Leader, How They Brought the Good News from Ghent to Aix, Evelyn Hope, Home Thoughts from Abroad, Home Thoughts from the Sea, Incident of the French Camp, The Boy and the Angel, One Word More, Hervé Riel, Pheidippides.*

II. BOOKS PRESCRIBED FOR STUDY AND PRACTICE.

For 1909, 1910, and 1911: Shakespeare's *Macbeth;* Milton's *Lycidas, Comus, L'Allegro,* and *Il Penseroso;* Burke's *Speech on Conciliation with America,* or Washington's *Farewell Address* and Webster's *First Bunker Hill Oration;* Macaulay's *Life of Johnson,* or Carlyle's *Essay on Burns.*

Changes for the year 1912:

1. Tennyson's *Gareth and Lynette, Lancelot and Elaine,* and *The Passing of Arthur* are inserted in the list of Books for Study as an alternative to Milton's poems.

2. *Lycidas* is dropped from the list of Milton's poems.

3. In group VI of the Reading List, Tennyson's *Princess* is substituted for the *Idylls* transferred to the Study List.

4. In Group V, Carlyle's *Heroes and Hero Worship* is changed to Carlyle's *The Hero as Poet, The Hero as Man of Letters,* and *The Hero as King.*

5. The number of books to be selected in Group V is changed from two to one.

6. In Group III (Book I), is substituted for (Selections) from *Færie Queene.*

7. In the preliminary statement of the requirement for

Reading and Practice, nine is substituted for ten as the number of books to be offered for examination.

With reference to the second list, the Joint Committee recommends that each of the books prescribed for study be taught with reference to subject matter, form and structure; and that, in addition, attention be given to the essentials of English grammar and to the leading facts in those periods of English literary history to which the prescribed works belong.

The above lists and requirements are intended to indicate in a general way the extent and character of the required work, and are not to be interpreted as limitations upon the teacher's choice. Books of equal merit, covering a similar range of literary types, will meet the requirements satisfactorily.

(*c*) *Composition.* Regular and persistent training in both written and oral composition should be given throughout the entire school course. In the high school, instruction in this subject should not be broken up into term or semester courses, but should be regarded as continuous throughout the four years. As regards the subjects for composition, they should be taken in the high school course partly from the list of books prescribed for study and practice, or from other literature which the class may read; partly from the student's own thought and experience. The topics should be so chosen as to give practice in the four leading types of prose discourse, namely, Description, Narration, Exposition and Argument.

(*d*) *Rhetoric.* It is expected that the student will be familiar with the essential principles of rhetoric. The instruction in this subject should begin early in the high school course in connection with the work in composition, and should include the following particulars: choice of words; structure of sentences and paragraphs; the principles of narration, description, exposition and argument. The teacher should distinguish between those parts of rhetorical theory which are retained in text-books merely through the influence of tradition and those which have direct bearing upon the composition work. The former may be safely omitted.

A thorough revision of the requirements in English is planned in 1909.

MATHEMATICS.

COMMITTEE.

C. E. Comstock (Chairman), Professor of Mathematics, Bradley Polytechnic Institute, Peoria, Illinois.

H. Hancock, Professor of Mathematics, University of Cincinnati.

J. L. Markley, Junior Professor of Mathematics, University of Michigan.

A. Darnell, Head of Department of Mathematics, Central High School, Detroit, Mich.

H. E. Slaught, Assistant Professor of Mathematics, University of Chicago.

J. F. Downey, Professor of Mathematics and Dean of the College of Science, Literature and Arts, University of Minnesota.

W. A. Bartlett, Principal High School, Winona, Minnesota.

E. R. Hedrick, Professor of Mathematics, University of Missouri.

I. I. Cammack, Principal Central High School, Kansas City, Missouri.

E. B. Skinner, Assistant Professor of Mathematics, University of Wisconsin.

A. L. Candy, Professor of Mathematics, University of Nebraska.

A. R. Congdon, Principal of High School, Fremont, Nebraska.

H. B. Newson, Professor of Mathematics, University of Kansas.

A. M. Bogle, Teacher of Mathematics, Kansas City (Kansas) High School.

G. W. Nash, President Northern Normal and Industrial School, Aberdeen, South Dakota.

J. D. Harlor, Head of Department of Mathematics, East High School, Columbus, Ohio.

S. W. Reaves, Professor of Mathematics, University of Oklahoma.

Florian Cajori, Dean of School of Engineering, Colorado College.

E. L. Brown, Principal, North Side High School, Denver, Colorado.

Definitions (4 units).

In mathematics the commission adopts the statement of the College Entrance Examination Board, except that a somewhat smaller portion in algebra is assigned to the first year, and a review of essentials is recommended in connection with the advanced course in algebra.

1. *Algebra.* The four fundamental operations for rational algebraic expressions, factoring, highest common factor, lowest common multiple, complex fractions, the solution of equations of the first degree containing one or more unknown quantities, radicals, including the extraction of the square root of polynomials and numbers, and fractional and negative exponents. Quadratic equations and equations containing one or more unknown quantities that can be solved by the methods of quadratic equations, problems depending upon such equations.

2. *Plane Geometry,* including the solution of simple original exercises and numerical problems.

3a. *Algebra.* A review of the essentials to be followed by ratio and proportion, and the binomial theorem for positive integral exponents. The progressions, the elementary treatment of permutations and combinations, and the use of four and five place tables of logarithms.

3b. *Solid Geometry,* including properties of straight lines and planes, of dihedral and polyhedral angles, of projections, of polyhedrons, including prisms, pyramids and the regular solids, of cylinders, cones and spheres, of spherical triangles, and the measurement of surfaces and solids.

4a. *Algebra.* Undetermined coefficients, the elementary treatment of infinite series, the binomial theorem for fractional and negative exponents, and the theory of logarithms.

Determinants, and the elements of the theory of equations, including Horner's method for solving numerical equations.

4b. *Trigonometry.* Plane Trigonometry, including the definitions and relations of the six trigonometrical functions as ratios, proof of important formulæ, theory of logarithms and use of tables, solution of right and oblique plane triangles. Spherical Trigonometry, including the proof of important formulæ and the solution of right and oblique spherical triangles with the proper interpretation of the ambiguous cases.

The colleges make no formal entrance requirement in arithmetic, but presuppose a thorough training in this subject—the four fundamental operations with whole numbers, decimal and common fractions, percentage and its simple applications—as antecedent to the formal study of geometry and algebra. In connection with the latter subjects the facility in computation gained in arithmetic should be exercised and strengthened; these subjects, on the other hand, round out the work of arithmetic and make possible a more careful proof of its theory. The aspect of algebra as generalized arithmetic should be constantly kept in mind, and the theorems of arithmetic contained as special cases in those of algebra should be pointed out, exemplified, and applied in numerical cases. The examinations in algebra and geometry may always and should usually test incidentally the candidate's theoretical and practical knowledge of arithmetic.

In integral connection with arithmetic geometric forms should be studied from the outset, their principal properties being learned by observation and experiment. Informal proofs of a deductive character may be gradually introduced, as the pupils feel, or may be led to feel, the need for such proofs.

Similarly, the advantages of the literal representation of numbers may be gradually made evident and utilized in the solution of problems, leading to simple equations, and in the compact and clear statement of results (formulæ). Initially the natural literal notations (for number of units of length, etc.) should be used exclusively.

Mathematics owes its genesis largely to the needs of measurement. As in the race, so in the individual, the generalizations, the abstract form should be developed late, though foreshadowed long. From the beginnings of arithmetic to the close of the secondary school at least, the march should always be from the concrete to the abstract. The concrete is itself variable; what is abstract at one stage is quite concrete at another. In the secondary school, many concrete starting points for mathematical work are to be found in the physical sciences; for algebra the specific numerical relations of arithmetic often furnish a concrete basis.

In the secondary school arithmetic, algebra, geometry, and trigonometry should be regarded and treated as different phases of one subject, mathematics, and not as different and mutually exclusive subjects. The geometric, the arithmetical, the algebraic, and the physical phases of mathematics should be presented from the beginning to the end of the secondary school course. To do this best and most freely would require some reshaping of curricula, which should come gradually. But the individual teacher can do much, pending this readjustment, by letting down the barriers, by using geometry in algebra, and algebra in geometry, by concrete physical, graphical, arithmetical work, by free use of whatever material or methods will help towards the main end.

The teacher's constant aim should be to train the pupil to *think*: to observe accurately; to describe accurately in language, in picture, in equation; to make inferences correctly; to act on his inferences; to formulate clearly what he has done. The pupil's attitude must be, in the main, that of an active worker, not that of a passive listener.

With the systematic restoration of the close relations between mathematics and the physical sciences, so long unnaturally severed in the instruction of the secondary school, it is well to consider the methods of instruction in the physical laboratory. Some of these methods, suitably modified, may be of value also in the instruction in mathematics.

It is desirable that teachers keep themselves informed concerning movements in progress for the improvement of the teaching of mathematical science.

HISTORY.

COMMITTEE.

J. A. James (Chairman), Professor of History, Northwestern University.

H. E. Bourne, Professor of History, Western Reserve University.

H. V. Hotchkiss, Superintendent of Public Schools, Akron, Ohio.

H. V. Church, Principal, J. Sterling Morton High School, Clyde, Illinois.

D. C. Munro, Professor of European History, University of Wisconsin.

W. C. Howe, Instructor in History, West Division High School, Milwaukee, Wisconsin.

W. M. West, Professor of History, University of Minnesota.

H. H. Freer, Professor of Economics and Sociology, Cornell College, Mt. Vernon, Iowa.

N. W. Lambkin, Teacher of History, High School, Clinton, Missouri.

H. W. Caldwell, Professor of American History, University of Nebraska.

Amanda J. Sundeau, Teacher of History, High School, Lincoln, Nebraska.

C. H. Rhodes, Principal, High School, Winfield, Kansas.

W. W. Girton, Teacher of Civics, State Normal School, Madison, South Dakota.

J. S. Ellis, Lake Preston, South Dakota.

J. S. Buchanan, Professor of History, University of Oklahoma.

J. F. Willard, Professor of History, University of Colorado.

M. C. Potter, Superintendent of Schools, Idaho Springs, Colorado.

Definitions (4 units).

1. Ancient history, with special reference to Greek and Roman history, and including also a short introductory study of the more ancient nations and the chief events of the early middle ages, down to the death of Charlemagne (814).

2. Mediæval and modern European history, from the death of Charlemagne to the present time.

3. English history.

4. American history, or American history and civil government.

The periods that are here indicated as constituting the four units were recommended by the Committee of Seven of the American Historical Association in their report to the Association in 1899. The full report is published under the title "The Study of History in Schools." It contains suggestions as to various methods of treating these periods, and gives further information likely to be of service to the teacher. A short course of one year in general history of the world has been in a great measure abandoned by the schools, because it does not give the opportunity for the more concrete study and for the training in historical thinking that can be obtained from the more intensive work. The plan of continuing ancient history to the time of Charlemagne or the establishment of the Holy Roman Empire has much to commend it, and is now adopted in many schools. Excellent books have been prepared which will enable the teachers to cover the field, as a whole, satisfactorily. By continuing the study of ancient history down into the early middle ages, a reasonable adjustment of time between the earlier and later periods is secured; and from the purely historical as well as the pedagogical point of view, there is much to be said in favor of connecting Roman history with the later times; the pupil is not left in the confusion of the fallen or the decadent empire. In connection with a year's work in American history much instruction can be given in civil government; a course dwelling on the development of American political ideals and the actual workings of institutions necessarily gives information concretely of the present governmental forms and methods.

No definite statement need be made concerning the mode of teaching or the apparatus that should be used. But it may be said that the mere learning of a text will not give the preparation that the colleges desire. Happily the time is gone when teachers are inclined to confine their classes to the memorizing of a single text. Some colleges in their entrance examination expect the candidate to present notebooks showing the amount and character of the work done in the schools. It is desirable that notebooks or cards should be kept as a record of the work done. They may contain copious extracts from primary and secondary authorities, references to important material, sketch maps made by the pupils as illustrations of their studies, and informal notes on reading that has been done in connection with the course. Such work is necessary if the historical courses are to give their best educational results. Effort should be made to cultivate the power of handling facts and of drawing proper inductions from data, to develop the faculty of discrimination, to teach the pupils the use of books and how to extract substance from the printed page. The acquisition of information alone can not be the chief aim of any school work; knowledge of how to acquire information and, above all, some skill in putting forth what one knows must always be of more than secondary importance; history therefore should be taught as a disciplinary and educational subject.

The teacher of history in the secondary school should have completed a four year college course or the equivalent. He should have completed courses in history aggregating *at least* twelve hours for one year, including one "intensive" or "research" course. In the selection of these courses, at least three fields of history represented in the secondary school units should be chosen. It is also strongly recommended that the teacher should have pursued elementary courses in economics and political science.

The school library or an accessible public library should be equipped with at least the following numbers of well-selected books on the different units: Ancient History, 25 volumes; Mediæval and Modern History, each 25 volumes; English History, 50 volumes, and United States History, 75 volumes.

In addition to a good text-book, the pupil should have read in connection with each unit of History, as a minimum, the following amounts of carefully selected collateral material, of which at least one-fourth should be source material: Ancient History, 200 pp.; Mediæval and Modern European History, each 150 pp.; English History, 300 pp.; American History, 350 pp. (It is understood that Civics is additional.) Especial care should be exercised by the teacher in testing the reports on outside reading, to see that the best results are obtained. The pupil should show ability also in map analysis and the completion of outline maps.

The history class-room should contain standard maps and the pupils should have access to good historical atlases. Photographs of historic scenes ought also to constitute a part of the school equipment for the use of the teacher of history.

[illegible] OF THE

[illegible]

[illegible] High School, Ch-

[illegible] Latin Languages

[illegible] School, Detroit,

[illegible] College, Lake

[illegible] School, Joliet,

[illegible] Wisconsin.

[illegible] Minnesota.

[illegible]

[illegible] Missouri.

[illegible] Uni-

[illegible] School,

[illegible] Kan-

[illegible]

[illegible] High

[illegible] School,

[illegible]

[illegible]

Definitions of Latin (4 units).

In Latin the commission adopts the first two units as defined by the American Philological Association, and the third and fourth units as defined by the College Entrance Examination Board.

1. Latin lessons, accompanied from an early stage by the reading of very simple selections. Easy reading: twenty to thirty pages of consecutive text.

In all written exercises the long vowels should be marked, and in all oral exercises pains should be taken to make the pronunciation conform to the quantities.

The student should be trained from the beginning to grasp the meaning of the Latin before translating, and then to render into idiomatic English; and should be taught to read the Latin aloud with intelligent expression.

2. Selections from Cæsar's Gallic War equivalent in amount to four books; selections from other prose writers, such as Nepos, may be taken as a substitute for an amount up to, but not exceeding, two books.

The equivalent of at least one period a week in prose composition based on Cæsar.

Reading aloud and translating, together with training in correct methods of apprehending the author's meaning, both prepared and unprepared passages being used as material. The memorizing of selected passages.

3, 4. Cicero: Any six orations from the following list, but preferably the first six mentioned:

The four orations against Catiline, Archias, the Manilian Law, Marcellus, Roscius, Milo, Sestius, Ligarius, the fourteenth Philippic.

Vergil: The first six books of the Aeneid.

The equivalent of at least one period a week in prose composition based on Cicero.

Note: In place of a part of Cicero an equivalent of

Sallust's Catiline, and in place of a part of Vergil an equivalent of Ovid will be accepted.

Definitions of Greek (3 units).

In Greek the definitions of the three units of the Philological Association are adopted.

1. Introductory lessons:
   Xenophon's Anabasis (20 to 30 pages).
   Practice in reading at sight and in writing Greek.
   Systematic study of grammar begun.
2. Xenophon's Anabasis (continued), either alone or with other Attic prose (75 to 120 pages).

Practice in reading at sight, systematic study of grammar, thorough grammatical review, and practice in writing Greek, both based on study of Books I and II of the Anabasis.

3. Homer (2,500 to 4,000 lines); e. g., Iliad, I-III (omitting II, 494-end), and VI-VIII.

Attic prose (33 to 40 pages), with practice in writing Greek; grammar, practice reading at sight.

GERMAN

High-school classes, if made up of eleventh and twelfth grade pupils, can do the work fitting them for second-year University classes in three semesters. If German is begun in the lower grades more time should be given to the same work. Four semesters of German in the high school will ordinarily admit to Course 4 (Calendar number), while six full semesters prepare students for University classes 5 and 5*a*. The high-school course should be arranged somewhat as follows:

A *First Year.*

(*a*) Very careful and persistent drill in pronunciation.

(*b*) Thoro and systematic drill in the essentials of grammar: inflection of articles, pronouns, nouns, strong, weak and mixed; the more general rules of gender; classification of nouns, particularly those pertaining to every-day life; the declension of the auxiliaries, modal and others; strong, weak and mixed verbs; the formation of the passive voice; the main principles of mode and tense; the various sentence orders. The use of German script, while not absolutely essential, is nevertheless highly desirable.

(*c*) Memorizing and frequent repetition of easy colloquial phrases and sentences. Efforts should be made at all times to make the facts of the language, at the student's command, real and living. Frequent and systematic exercises consisting of variations of phrases or sentences as to tense, mode, person, number, etc., are exceedingly helpful in fixing the inflections, the "mechanics," so to speak, of the language. Also the student's self-confidence and sense of power are greatly increased in pursuing the method here suggested. Ordinarily it will be found that the work outlined so far will require the entire year, not much time, if any, being left for reading. This is sure to be the case if the class is made up of students in the tenth grade, or of those who have never had Latin. If, on the other hand, the class has had previous linguistic training, or if composed of fairly mature students of the last two years of the high school, a good beginning in reading ought to be made during the latter half of the second semester. It is only to such classes that the following reading requirements can profitably be made to apply as a part of the first year's work.

(*d*) Reading of from fifty to one hundred pages of graduated texts, either from readers or otherwise. Study and analysis of the more transparent compounds and derivatives. Adequate translations into English should always be followed by distinctly articulated reading, both individual and in concert of the German text.

B. *Second Year, first semester.*

Formal and systematic grammar can now gradually be assigned second place, though it should by no means be neglected or laid aside. In the course of every reading lesson there are ample opportunities to discover weak places in the student's language preparation; these should be strengthened and fortified. While it is undoubtedly true that the study of grammar is to assist in the mastery of the language, and not *vice versa*, the fact remains that the pupil who neglects the study of the generalized facts and principles of a foreign tongue, *i. e.*, its grammar, cannot hope to master the vast mass of material involved in even an elementary knowledge of that tongue. The why's and wherefore's, both of form and content (thought), which a given word or sentence presents, must be understood in order to prevent mere hit-or-miss guessings and blunderings.

During the semester the average class can readily manage to read and work over some seventy-five to one hundred pages of rather more advanced reading than that presented in ordinary readers. The aims and objects of the first year can now be enlarged upon and developed; the vocabulary should be built up systematically and persistently; the salient principles in word-formation and syntax must be drilled into the student; he can be led to observe the most striking differences and resemblances between German and his mother tongue. Throughout the second year, but more particularly in the second semester, weekly exercises in easy German composition should form a part of the course. Wesselhoeft's or Harris' little books on the subject will furnish ample material.

C. *Second Year, second semester.*

During the second half of the second year the class can profitably read some 100 to 125 pages of text, again somewhat more advanced than those of the preceding semester. The proper grading of reading matter is of the utmost importance. Besides continuing the lines of work suggested in the first semester, the class is gradually getting ready to feel the German as an adequate, self-sufficient and independent medium for expressing thought. Up to this time the process of learning consisted necessarily in joining English meanings to German sounds or symbols. But from now on the associations and familiarity with the vocabulary ought to increase quite rapidly so as to dispense with the constant translation, or "thinking in English." The texts read *should be sufficiently easy* to permit the gradual doing away with the double medium. Moderate but steady pressure along this line will tend to develop the student's reliance on German, making him more or less independent of English equivalents. Of course, difficult passages, or an unusual vocabulary, call for rigid treatment in the student's mother tongue. Otherwise there will inevitably result looseness and inaccuracy of thought, and shiftlessness of work.

The net result of the first four semesters of a high-school German course should be

(*a*) A good and ready pronunciation.

(*b*) A ready and fairly complete working knowledge of grammar, especially on the formal (inflectional) side.

(*c*) The reading and thoro mastery of some 200 to 250 pages of suitable texts.

(*d*) The acquisition of a fair working vocabulary, involving the mastery of at least 85 per cent of the words occurring in the texts read and worked over.

(*e*) A mastery of ordinary and familiar idioms, such as, *es tut mir leid, Sie haben recht, nehmen Sie sich in acht,* etc.

(*f*) The ability to translate (with the help of a vocabulary for uncommon terms) from German into English any text of similar difficulty as the ones worked over in class.

D. *Third Year.*

Much of the work done in the third year should consist, incidentally, in reviewing and applying the work of the first two years. Ground that has once been gained should never be given up. There should be a *resumé*, a gathering up, and coördination of the more or less isolated fragments of knowledge which the student has gotten hold of in his earlier semesters. The bearing of German on English grammar or usage should occasionally, even if only incidentally, be brought home to the student. The study of German, while in and of itself important enough to be a part of the school curriculum, finds additional justification in the illuminating sidelight which it throws upon the structure and characteristics of the English tongue. Nevertheless, the teacher of German must not go too far afield to teach English grammar. His own domain is quite vast enough to demand his attention.

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The main object of the third year's work should be to enable the student "to read at sight German prose of ordinary difficulty, whether recent or classical; to put into German a connected passage of simple English, paraphrased from a given text in German; to answer any grammatical questions relating to usual forms and essential principles of the language, including syntax and word-formation, and to translate and explain (so far as explanation may be necessary) a passage of classical literature taken from some text previously studied." Thus the Report of the Committee of Twelve (raised some years ago by the N. E. A. for the purpose of fixing and defining the requirements for admission to American colleges). The requirement "at sight," if interpreted too rigidly, could hardly be met by the average school. However, it is more than likely that the framers of the Report would not expect a graduate of a three-year German course to read German without some aid from dictionary or special vocabulary. *But enough power and familiarity with average textual and grammatical peculiarities should be acquired to make the understanding of moderately difficult German a comparatively easy task.* The texts read and studied should put the student in touch with German thought and life, with German tradition and ideals. They should afford glimpses of the Fatherland and its people, their characteristics and civilization. If possible, the student should get a little taste of the German literature and have his finer sensibilities quickened and his appreciation of the beautiful cultivated.

The Committee ventures to select a few of the many grammars and other available texts suitable for high schools and other preparatory institutions. Teachers and school officers need to exercise the utmost care in the selection of books. No one book can claim the title of "best." Circumstances and conditions vary so greatly that it is practically impossible for any one but the officers in charge to make the wisest and most suitable choice.

GRAMMARS

1. Vos. Essentials of German. H. Holt & Co.
2. Bierwirth. Beginning German. H. Holt & Co.
3. Becker. Elements of German. Scott, Foresman & Co.
4. Bacon. New German Course. Charles E. Merrill Co.
5. Collar. First Year German. Ginn & Co.

Additional information can be gotten conveniently from descriptive catalogs of modern language publications put out by:

Allyn & Bacon, Chicago; American Book Co., Chicago; Charles E. Merrill Co., New York; Ginn & Co., Chicago; D. C. Heath & Co., Chicago; Macmillan Co., New York; Scott, Forsman & Co., Chicago; Silver, Burdette & Co., Chicago.

READERS

1. Huss. German Reader. Heath & Co.
2. Muller & Wenckebach. Gluck auf. Ginn & Co.
3. Harris. German Reader. H. Holt & Co.
4. Lutz. Elementary German Reader. Silver, Burdette & Co.
5. Super. Elementary German Reader. Ginn & Co.

The following easy German texts are suitable for the first year:

Storm's *Immensee*, Zschokke's *Der zerbrochene Krug*, Gerstacker's *Germelshausen*, Spyri's *Der Geissbub* or *Rosenresli*, Leander's *Traumereien*, Grimm's *Kinder- und Hausmärchen*, Seligmann's *Altes und Neues*, and Stern's *Geschichten vom Rhein*.

The following texts, somewhat more advanced, are suitable for the second year:

Wildenbruch's *Das edle Blut*, Hauff's *Das kalte Herz*, Storm's *In St. Jürgen*, Heyse's *L'Arrabbiata* or *Das Mädchen von Treppi*, Moser's *Der Bibliothekar* (comedy), Meyer's *Das Amulet*, Millern's *Höher als die Kirche*, Keller's *Das Fähnlein der sieben Aufrechten*, Andersen's *Bilderbuch ohne Bilder*, Benedix' *Der Prozess* (comedy), and Mosher's *Willkommen in Deutschland*.

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The following are suitable texts for the third year:

Thiergen's *Am deutschen Herd*. Riehl's *Burg Neideck*. Niese's *Aus dänischer Zeit*. Ebner-Eschenbach's *Die Freiherren von Gemperlein*. Freytag's *Die Journalisten*. Arnold's *Aprilwetter*. Hatfield's *Lyrics and Ballads*. Lessing's *Minna von Barnhelm*. Schiller's *Jungfrau von Orleans* or *Tell*. Goethe's *Hermann und Dorothea*. and Sudermann's *Frau Sorge* (novel).

The average third year class should be able to read and master some 350 to 400 pages of the above texts, or works of equal degree of difficulty. Narrative prose should predominate

GENERAL REFERENCE WORKS

1. Flügel-Schmidt-Tanger. German-English and English-German Dictionary. 2 vols. Excellent for idiomatic expressions and colloquial phrases. A thoroughly valuable book.
2. Heath's or Holt's German Dictionary.
3. Hempl. German Orthography and Phonology. Ginn & Co
4. Vietor. Die Aussprache des Schriftdeutschen.
5. Siebs. Deutsche Bühnenaussprache.
6. Bagster-Collins. The Teaching of German in Secondary Schools. Macmillan.
7. Bahlsen. The Teaching of Modern Language. Ginn & Co
8. Report of the Committee of Twelve of the Modern Language Association of America. Of great practical value to every teacher of German. D. C. Heath & Co.
9. Dawson. German Life in Town and Country. Putnam, New York.
10. Sime. History of Germany. H. Holt & Co.
11. Hosmer. Short History of German Literature. Charles Scribner's Sons.
12. Wells. History of German Literature. Roberts Brothers, Boston.

Information concerning German books, pictures, lantern-slides, or maps may be obtained of G. E. Stechert, 129-133 W. 20th street, New York City; Lemcke & Buechner, 11 East 17th street, New [illegible] George [illegible] [illegible] department of the University [illegible] and definite assistance to the [illegible] of the state. Correspondence [illegible] in all matters is invited. Address [illegible] University of Nebraska, Lincoln

GERMAN.

COMMITTEE.

ence Fossler (Chairman), Professor of Germanic Languages and Literatures, University of Nebraska.

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Definitions (4 units).

1. During the first year the work should comprise:

(1) Careful and persistent drill upon connected pronunciation;

(2) The memorizing and frequent repetition of easy colloquial sentences;

(3) Drill upon the rudiments of grammar; viz. upon the inflection of the articles, of such nouns as belong to the language of everyday life, of adjectives, pronouns, weak verbs, and the more *usual* strong verbs; also upon the use of the more common prepositions, the simpler uses of the modal auxiliaries, and the elementary rules of syntax and word-order;

(4) Abundant easy exercises designed not only to fix in mind the forms and principles of grammar, but also to cultivate readiness in the reproduction of natural forms of expression;

(5) The reading of from 50 to 100 pages of graduated texts from a reader or other text, with constant practice in translating into German easy variations upon sentences selected from the reading lesson (the teacher giving the English). Besides parts of Readers available for first year's class-work, good selections may be made from Müller und Wenckebach's Glück Auf; Kern's (Grimm's) German Stories Retold; Guerber's Märchen and Erzählungen; Seeligmann's Altes and Neues.

It will be found, however, that the work as outlined in the above, can be done successfully only when the students of the class are either fairly mature (say, in the 11th or 12th grade), or have had some previous language training. It is only to such that the full reading requirements can profitably be made to apply as a part of the first year's work. *The chief consideration is thoroughness and accuracy, is to put the student upon firm and sure ground, and never to give up what has already been gained.*

2. During the second year the work should comprise:

(1) The reading of from 150 to 200 pages of suitable texts in the form of easy stories and plays;

(2) Accompanying practice, as before, in the translation into German and easy variations upon the matter read;

(3) Continued drill upon the essentials of the grammar, directed to the ends of enabling the pupil, first, to use his knowledge with facility in the formation of sentences and, secondly, to state his knowledge correctly in the technical language of grammar.

Reading material suitable for the elementary course, other than that already mentioned, can be selected from the following list: Andersen's Märchen and Bilderbuch ohne Bilder; Arnold's Fritz auf Ferien; Baumbach's Die Nonna and Der Schwiegersohn; Gerstaecker's Germelshausen; Heyse's L'Arrabbiata, Das Mädchen von Treppi, Die Blinden; Storm's Immensee and Geschichten aus der Tonne; In St. Jürgen; Auerbach's Brigitta; Keller's Legenden; Fulda's Under vier Augen; Wildenbruch's Der Letzte, or, Das edle Blut; Frommel's Eingeschneit; Seidel's Aus goldnen Tagen; Zschokke's Der zerbrochene Krug; Blüthgen's Das Peterle von Nürnberg.

The net results of the first two years of a high school German course should be:

(a) A correct and ready pronunciation.

(b) A ready, *exact,* and fairly complete working knowledge of grammar, especially on the formal (inflectional) side.

(c) At least some ability to speak and understand the foreign spoken language.

(d) A better understanding of the grammatical structure of the English language.

(e) The reading of some 200-250 pages of suitable texts and the mastery of the fundamental facts of the language involved and illustrated in them.

(f) The acquisition of a fair working vocabulary, involving the full mastery of some 80 per cent of the words occurring in the texts read and worked over.

(g) Ready familiarity with ordinary or common idiomatic phrases or other expressions, such as *es tut mir leid, Sie haben recht, nehmen Sie sich in acht, wo hat er das her?* etc.

(h) The ability to understand and translate (with the help of a vocabulary for uncommon terms) from German into English texts of similar degree of difficulty as the one worked over in class.

In words of one of the high school manuals "The ideals of enabling the student eventually to read German literature in German without translating should be ever before the teacher. . . . . . . Modern German literature is so rich in novelistic, dramatic, historical, and lyrical productions of a high order that, even for the more elementary classes, good literary selections may be found well suited to the age and preparation of high school students. If this principle be strictly observed, the instruction of German will gain enormously in dignity and interest, and will greatly extend the range of knowledge and culture of the student."

3. The work of the third year should comprise:

(1) A thorough and systematic review of the fundamental facts, the grammar of the language in connection with suitable practice in composition. A text-book, such as Harris', Wesselhoeft's, or Bernhardt's, German Composition, should be used for his purpose. Neither the teacher nor the pupil should trust himself to the process of merely "incidental" grammar and composition exercises. At least two recitation periods per week should be devoted to this purpose.

(2) The reading of some 300-400 pages of moderately difficult prose. A selection may be made from the following texts: Ebner-Eschenbach's Die Freiherren von Gem-

perlein; Freytag's Die Journalisten or his Bilder aus der deutschen Vergangenheit—for example, Karl der Grosse, Aus den Kreuzzügen, Doktor Luther, Aus dem Staat Friedrich's des Grossen; Gerstaecker's Irrfahrten; Meyer's Der Schusz von der Kanzel, Goethe's Hermann und Dorothea, Hoffman's Historische Erzählungen; Lessing's Minna von Barnhelm; Meyer's Gustav Adolf's Page; Moser's Der Bibliothekar; Riehl's Novellen—for example, Burg Neideck; Der Fluch der Schönheit, Der stumme Ratsherr, Das Spielmannskind; Rosegger's Waldheimat; Schiller's Wilhelm Tell, Die Jungfrau von Orleans, Das Lied von der Glocke; Sudermann's Frau Sorge; selections from the poems of Uhland, Heine, Schiller, Goethe, etc., as found e. g. in Hatfield's collection of German Lyrics and Ballads.

4. The work of the fourth year should comprise the reading of about five hundred pages of good literature in prose and poetry, reference readings upon the lives and works of the great writers studied, the writing in German of numerous short themes upon assigned subjects, independent translation of English into German. Favored texts seem to be: Goethe's Sesenheim, Dichtung und Wahrheit, Egmont, Iphigenie; Schiller's Maria Stuart; Lessing's Minna von Barnhelm; Kleist's Michael Kohlhaas, Prinz von Homburg, Fulda's Der Talisman, Grillparzer's Der Traum ein Leben, Sappho, Ludwig's Zwischen Himmel und Erde, Hebbel's Agnes Bernauer, Scheffel's Ekkehard, Hauff's Lichtenstein.

The nature and scope of the fourth year's work may well be left to the direction of the authorities issuing the several high school Manuals, and to those in immediate charge of these advanced courses. It is possible that even here many teachers will feel the necessity of insisting upon the more formal aspects of the problem, others may feel that the advancement and maturity of the class will warrant a sympathetic and systematic study of literature proper.

FRENCH AND SPANISH.

COMMITTEE.

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Definitions of French (4 units).

The definitions of the four units in French are those recommended by the Committee of Twelve of the Modern Language Association.

1. During the first year the work should comprise: (1) careful drill in pronunciation; (2) the rudiments of grammar, including the inflection of the regular and the more common irregular verbs, the plural of nouns, the inflection of adjectives, participles, and pronouns; the use of personal pronouns, common adverbs, prepositions, and conjunctions; the order of words in the sentence, and the elementary rules of syntax; (3) abundant easy exercises, designed not only to fix in the memory the forms and principles of grammar, but also to cultivate readiness in the reproduction of natural forms of expression; (4) the reading of from 100 to 175 duodecimo pages of graduated texts, with constant practice in translating into French easy variations of the sentences read (the teacher giving the English), and in reproducing from memory sentences previously read; (5) writing French from dictation.

2. During the second year the work should comprise: (1) the reading of from 250 to 400 pages of easy modern prose in the form of stories, plays, or historical or biographical sketches; (2) constant practice, as in the previous year, in translating into French easy variations upon the texts read; (3) frequent abstracts, sometimes oral and sometimes written, of portions of the text already read; (4) writing French from dictation; (5) continued drill upon the rudiments of grammar, with constant application in the construction of sentences; (6) mastery of the forms and use of pronouns, pronominal adjectives, of all but the rare irregular verb forms, and of the simpler uses of the conditional and subjunctive.

Suitable texts for the second year are: About's *Le roi des montagnes,* Bruno's *Le tour de la France,* Daudet's easier short tales, La Bedolliere's *La Mère Michel et son chat,* Erckmann-Chatrian's stories, Foa's *Contes biographiques* and *Le Petit Robinson de Paris,* Foncin's *Le pays de France,* Labiche and Martin's *La poudre aux yeux* and *Le voyage de M. Perrichon,* Legouvé and Labiche's *La cigale chez les fourmis,* Malot's *Sans famille,* Mairet's *La tache du petit Pierre,* Merimee's *Colomba,* extracts from Michelet, Sarcey's *Le siége de Paris,* Verne's stories.

3. This should comprise the reading of from 400 to 600 pages of French of ordinary difficulty, a portion to be in the dramatic form; constant practice in giving French paraphrases, abstracts or reproductions from memory of selected portions of the matter read; the study of a grammar of moderate completeness; writing from dictation.

Suitable texts are: About's stories, Augier and Sandeau's *Le Gendre de M. Poirier,* Beranger's poems, Corneille's *Le Cid* and *Horace,* Coppee's poems, Daudet's *La Belle-Nivernaise,* La Brète's *Mon oncle et mon curé,* Madame de Sévigné's letters, Hugo's *Hernani* and *La chute,* Labiche's plays, Loti's *Pêcheur d'Islande,* Mignet's historical writings, Moliere's *L'avare* and *Le Bourgeois Gentilhomme,* Racine's *Athalie, Andromaque,* and *Esther,* George Sand's plays and stories, Sandeau's *Mademoiselle de la Seiglière,* Scribe's plays, Thierry's *Récits des temps mérovingiens.* Thiers' *L'expedition de Bonaparte en Egypte,* Vigny's *La canne de jonc,* Voltaire's historical writings.

4. This should comprise the reading of from 600 to 1,000 pages of standard French, classical and modern, only difficult passages being explained in the class; the writing of numerous short themes in French; the study of syntax. One unit.

Suitable reading matter will be: Beaumarchias's *Barbier de Seville;* Corneille's dramas; the elder Dumas's prose writings; the younger Dumas's *La question d'argent;* Hugo's *Ruy Blas,* lyrics and prose writings; La Fontaine's fables; Lamartine's *Graziella;* Marivaux's plays; Moliere's plays; Musset's plays and poems; Pellissier's *Mouvement littèraire au XIXe siècle;* Renan's *Souvenirs d'enfance et de jeunesse;* Rousseau's writings; Sainte-Beuve's essays; Taine's *Origines de la France contemporaine;* Voltaire's writings; selections from Zola, Maupassant, and Balzac.

Definitions of Spanish (2 units).

In Spanish the commission adopts the definitions of the two units of the College Entrance Examination Board, which are in close harmony with the definitions of French of the Modern Language Association.

1. During the first year the work should comprise (1) careful drill in pronunciation; (2) the rudiments of grammar, including the conjugation of the regular and the more common irregular verbs, the inflection of nouns, adjectives and pronouns, and the elementary rules of syntax; (3) exercises containing illustrations of the principles of grammar; (4) the reading and accurate rendering into good English of from 100 to 175 duodecimo pages of graduated texts, with translation into Spanish of easy variations of the sentences read; (5) writing Spanish from dictation.

2. During the second year the work should comprise: (1) the reading of from 250 to 400 pages of modern prose from different authors; (2) practice in translating Spanish into English, and English variations of the text into Spanish; (3) continued study of the elements of grammar and syntax; (4) mastery of all but the rare irregular verb forms and of the simpler uses of the modes and tenses; (5) writing Spanish from dictation; (6) memorizing of easy short poems.

Suitable texts for the second year are: Valera's *El pajaro verde;* Alarcon's *El final de Norma;* Valdes's *José;* Galdos's *Dona Perfecta, Marianela;* Padre Isla's version of *Gil Blas;* Carrion and Aza's *Zaragueta.*

PHYSICS.

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Definition (1 unit).

1. The unit in physics consists of at least one hundred and eighty periods of forty-five minutes each (equal to 135 hours) of assigned work. Two periods of laboratory work count as one of assigned work.

2. The work consists of three closely related parts; namely, class work, lecture-demonstration work, and laboratory work. At least one-fourth of the time shall be devoted to laboratory work.

3. It is very essential that double periods be arranged for the laboratory work.

4. The class work includes the study of at least one standard text.

5. In the laboratory, each student shall perform at least thirty individual experiments, and keep a careful note-book record of them. Twenty of these experiments must be quantitative; each of these must illustrate an important physical principle which is one of the starred topics in the syllabus of required topics, and no two must illustrate the same principle.

6. In the class work the student must be drilled to an understanding of the use of the general principles which make up the required syllabus. He must be able to apply these principles intelligently to the solution of simple, practical, concrete problems.

7. Examinations will be framed to test the student's understanding of and ability to use the general principles in the required syllabus, as indicated in 6.

8. The teacher is not expected to follow the order of topics in the syllabus unless he wishes to do so.

Syllabus of Required Topics.

This list of required topics is not intended to include all the material for the year's work. It is purposely made short, in order that each teacher may be free to supplement it in a way that fits his individual environment. It does include those topics which all agree are essential to a first course in physics, and which are capable of comprehension, at least to the extent specified in number 6 of the definition of the unit, by boys and girls of high school age.

*1. Weight, center of gravity.
*2. Density.
*3. Parallelogram of forces.
4. Atmospheric pressure; barometer.
*5. Boyle's law.
6. Pressure due to gravity in liquids with a free surface; varying depth, density, and shape of vessel.
*7. Buoyancy; Archimedes' principle.
*8. Pascal's law; hydraulic press.
9. Work as force times distance, and its measurement in foot-pounds and gram-centimeters.
10. Energy measured by work.
*11. Law of machines: work obtained not greater than work put in; Efficiency.
*12. Inclined plane.
*13. Pulleys, wheel and axle.
*14. Measurement of moments by the product of force times arm; Levers.
15. Thermometers: Fahrenheit and Centigrade scales.
16. Heat quantity and its measurement in gram calories.
*17. Specific heat.
*18. Evaporation; heat of vaporization of water.
*19. Dew point; clouds and rain.
*20. Fusion and solidification; heat of fusion.
21. Heat transference by conduction and convection.
22. Heat transference by radiation.
23. Qualitative description of the transfer of energy by waves.

24. Wave length and period of waves.
25. Sound originates at a vibrating body and is transmitted by waves in air.
*26. Pitch and period of sound.
*27. Relation between the wave length of a tone and the length of a string or organ pipe.
*28. Resonance.
29. Beats.
30. Rectilinear propagation of light; pin-hole camera.
*31. Reflection and its laws; image in a plane mirror.
*32. Refraction, and its use in lenses; the eye, the camera.
*33. Prisms and dispersion.
34. Velocity of light.
35. Magnetic attractions and repulsions.
*36. Field of force about a magnet.
37. The Earth a magnet; compass.
38. Electricity by friction.
39. Conductors and insulators.
*40. Simple galvanic cell.
*41. Electrolysis; definition of the Ampere.
*42. Heating effects; resistance; definition of the Ohm.
*43. Ohm's law; definition of the volt.
*44. Magnetic field about a current; electromagnets.
*45. Electromagnetic induction.
*46. Simple alternating current dynamo of one loop.
*47. Electromagnetic induction by breaking a circuit; primary and secondary.
48. Conservation of energy.

CHEMISTRY.

COMMITTEE.

H. E. Griffith (Chairman), Professor of Chemistry, Knox College, Galesburg, Illinois.

D. C. Rybolt, Principal of High School, Akron, Ohio.

Delos Fall, Professor of Chemistry, Albion College, Albion, Michigan.

W. L. Whitney, Teacher of Chemistry in High School, Saginaw, E. S., Michigan.

G. B. Frankforter, Dean of the School of Chemistry, University of Minnesota.

W. S. Hendrixson, Professor of Chemistry, Iowa College, Grinnell, Iowa.

F. N. Peters, Teacher in Chemistry, Central High School, Kansas City, Missouri.

B. Dales, Professor of Chemistry, University of Nebraska.

H. A. Senter, Head of Department of Chemistry, High School, Omaha, Nebraska.

E. A. White, Teacher of Chemistry, High School, Kansas City, Kansas.

Margaret V. Maguire, Teacher of Science, High School, Mitchell, South Dakota.

G. L. Holter, Professor of Chemistry, Agricultural and Mechanical College, Stillwater, Oklahoma.

W. P. Headden, Professor of Chemistry and Geology, Colorado Agricultural Colllege.

J. W. Lakin, Teacher of Science, High School, Greeley, Colorado.

Definition (1 unit.)

Chemistry is an art as well as a science. Acquaintance with its elements includes ability to *do* certain things ***intelligently*** as well as remembrance of the bare results of chemical changes. An organized account of the latter is only a sort of dessicated residuum if it is not illuminated by the experience acquired along with skill in the former. The books usually—and necessarily—give prominence to the second (the systematic aspect), leaving instruction in the art to the teacher. A requirement in chemistry, on the other hand, must emphasize the art, for it is universal. It will lay less stress on any particular list of substances, reactions, or topics, in view of the extent of the available material, the briefness of the school course and the consequent differences between equally good individual selections. The art cannot, of course, be acquired without a fair systematic knowledge, while a semblance of the systematic knowledge may be acquired without the art. The art is therefore more worthy of emphasis.

It will be noted that the art of chemistry consists in the practical knowledge of the physical properties of all kinds of matter and the utilization of this knowledge in arranging intelligently the conditions before chemical change, in noting all physical indications during experiment and distinguishing the significant ones, and in interpreting the result of this observation. It thus deals almost exclusively with physical conceptions and facts. It demands, therefore, a careful training in physical facts, physical observation and physical inference. Conventionalized chemical work which can progress without skill in this art (for example, reiterated observation of precipitations) is valueless.

Disregarding questions of order, and simply classifying the essential principles of instruction, the pupil should be taught:

1. *Technique of experimentation.*

    Properties of common apparatus in respect to structure and material. For example, how to make an apparatus air-tight and why. Object of such operations as washing and drying gases and how the object is attained.

    Physical properties which may be used for recognition of each substance and for explanation of all observations.

    Judicious use of proportions and materials. Influence of conditions (temperature, homogeneous and heterogeneous mixture, etc.) on chemical change.
2. Physical phenomena, their recognition, description, and physical interpretation.
3. The more strictly *chemical application* of the results. For example, inference in regard to the nature of the chemical change which must have led to the results observed. Making of the chemical equation from adequate data.

The material basis for the above may be found for the most part in the employment of a restricted number of elements and a few of their chief compounds. Facts should be simplified and systematized by generalization, and generalizations ("laws") should be illustrated and applied to familiar things. The usual theoretical explanations should be given as the facts accumulate. Laws and theories derive their importance from the facts, not *vice versa,* and none should be given unless and until the corresponding facts have been encountered in laboratory or class-room experiments.

A knowledge of important chemical industries and ability to work simple problems will be expected.

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[illegible]

[illegible]

[illegible]

[illegible]

C. F. [illegible], Professor of Geology and Mineralogy, University of Missouri.

P. [illegible], Teacher of Physical Geography and Geology, [illegible] High School, Kansas City, Missouri.

[illegible]

E. C. [illegible], Professor of Geology at University of [illegible] and State Geologist.

G. E. Condra, Professor of Geography and Economic Geology, University of Nebraska.

F. H. Hall, Superintendent of Schools, [illegible]

R. D. George, Professor of Geology, University of Colorado.

G. L. Cannon, Teacher of Physiography, East Side High School, Denver, Colorado.

Definition (1 unit).

The following outline includes only the most essential facts and principles of physical geography, which must be studied in the class room and laboratory:

THE EARTH AS A GLOBE.

Shape of earth: How proved; probable causes of.

Size: How measured.

Rotation: How proved; day and night; longitude and time; latitude.

Revolution: How proved; rate; path; direction.

Seasons and their causes.

Magnetism: Compass; variation in.

Map projection explained.

THE LAND.

Distribution. Graphic representation of topography.

Changes in land areas and in land forms: Effects of (1) elevation and depression, of (2) deposition of sediments, (3) of shore erosion.

Plains: Plains distinguished from the plateaus and mountains. Kinds of plains: classification based on genesis, on topography, on fertility, etc. Development of plains of different forms. Distribution of the great plains of the earth. The coastal plain of the Atlantic and Gulf coasts. The plains of the eastern interior. The plains of the western interior. Effect of climate and rock structure on topography of plains. Alluvial plains: their formation and importance. Relation of life to different forms of plains.

Plateaus: Relations to plains and to mountains. Stages in the history of a plateau; young plateaus, dissected plateaus, old plateaus, broken plateaus. Effect of climate, rock structure, etc., on topography of plateaus. Locations of the great plateaus. Life conditions on plateaus.

Mountains: Classes: block mountains; folded mountains; domed mountains; massive mountains; mountains of circumdenudation. History of mountains. Effects of climate, rock structure, etc., on mountain topography. Life conditions in mountains.

Volcanoes: Distribution. Phenomena of eruptions. History of a volcano. Influence of volcanoes on topography and life.

Rivers: Life history of a river from birth to old age. The work of rivers. The topography of surfaces shaped by river erosion at different stages of valley development. Revived rivers. Drowned rivers and valleys. The great drainage basins of the United States.

Lakes: The distribution of lakes, particularly in North America. The changes which they are undergoing. Their relations to rivers. Their effect on climate. Their relations to life in general. Salt lakes; their history. The origin of lake basins.

Glaciers: The nature of glacier ice. The distribution of glaciers. The conditions necessary for glaciers. Types of glaciers. The work of glaciers. Glaciated areas compared and contrasted with areas which have not been affected by ice; especially the glaciated and non-glaciated areas of North America.

THE ATMOSPHERE.

Composition and offices of atmosphere. Instruments used in study of atmosphere.

Temperature: Source of atmospheric heat, and variations of atmospheric temperatures. Isothermal charts of world, and of the United States, especially the January, July and annual charts, with special study of (1) isotherms of northern and southern hemispheres, (2) location of heat equator, (3) cold pole, (4) crowded isotherms, etc.

Pressure: Measurement of pressure. Determination of altitudes by atmospheric pressure. Relation to temperature. Study of isobars on U. S. weather maps. Distribution of pressure in general, in mid-winter (January), and in mid-summer (July). Relation of pressure (isobars) and temperature (isotherms).

Circulation of atmosphere: Winds; their causes; their classes; and their effects.

Moisture: Sources. Conditions for precipitation. Forms of precipitation; rain and snow; dew and frost; distribution of rain and snow; principles governing. Relation of precipitation to life.

Storms: Cyclones of temperate and tropical latitudes. Paths and characters of storms of United States. Relation of storms to general weather conditions. Weather at different seasons; study and construction of weather maps. Relation of weather to climate. Relation of climate, weather, etc., to life and to human industries.

THE OCEAN.

Form, divisions and general characteristics of the oceans, and of ocean basins. Depth, density and temperature of ocean waters. Characteristics of ocean floor; topography, material, etc. The life of the oceans.

Movement of ocean waters: Waves; cause and effect. Currents; causes and their proofs; important currents; effects of currents on climate, life, etc. Tides; character of motion; causes of tides; variation of tides, and their causes; bores; effect of tides on navigation, harbors, etc.

Work of ocean: Erosion and deposition. Shore lines; the leading types, and their distribution. Influence of harbors and coast lines, now and in the past.

Summary. The outline given can but enumerate the larger topics to be covered, and in a way suggest the point of view desired. Each topic should be treated so as to show its causal relations to other topics. So far as possible, the effects of earth features on life (especially human life) conditions should be emphasized.

Throughout the work an effort should be made to develop the student's ability to use the data presented. The acquisition of the facts presented in the text-books is in itself of relatively little value. The student should be taught to apply, out-of-doors and in the laboratory, the principles developed in the class room. When he can do this, and when he can utilize and combine the data presented in the books in new ways and to new ends, one of the chief aims of the study will have been accomplished.

The candidate's preparation should include:

a. The study of one of the leading secondary text-books in physical geography, for the sake of essential principles, and of well-selected facts illustrating those principles.

b. Individual laboratory work should occupy from one-fourth to one-half of the time of the student in the class-room. Field trips should take the place of some of the laboratory work in autumn and spring. The results of laboratory work should be carefully recorded in writing, and in many cases should be made the basis of class-room discussion. Similarly the field work should be made the basis of written reports or of subsequent class-room discussion, or both. In general the laboratory and the field should be made to afford illustrations of as many principles and phenomena as possible.

BOTANY.

COMMITTEE.

O. W. Caldwell (Chairman), Associate Professor of Botany, University of Chicago.

F. C. Newcombe, Professor of Botany, University of Michigan.

L. Murbach, Head of the Department of Biology, Central High School, Detroit, Michigan.

C. R. Barnes, Professor of Plant Physiology, University of Chicago.

R. A. Harper, Professor of Botany, University of Wisconsin.

M. F. Arey, Professor of Natnral Science, Iowa State Normal School, Cedar Falls, Iowa.

C. E. Bessey, Professor of Botany and Dean, University of Nebraska.

E. A. Bostrom, Superintendent of Schools, Osceola, Nebraska.

Alberta Cory, Teacher of Botany, High School, Kansas City, Kansas.

C. S. Parmenter, Vice President of Baker University, Baldwin, Kansas.

Eloise Butler, Teacher of Botany, South Side High School, Minneapolis, Minnesota.

M. F. Guyer, Professor of Biology, University of Cincinnati.

Francis Remaley, Professor of Biology, University of Colorado.

Ellsworth Bethel, Teacher of Botany, East Side High School, Denver, Colorado.

Definition (1 unit).

It is undesirable that the course in Botany should be given earlier than the second year (10th grade), but whenever given it is indispensable that the teacher should adapt the work carefully to the development of the pupils. Inasmuch as Botany is likely to be one of the first sciences studied it is of the utmost importance that the pupil should be guarded against hasty inferences and sweeping generalizations from insufficient data. No experiment should be conducted by him which is not checked by a control, and whenever possible the conditions should be such that only one variable factor marks the difference between the test and the control. Inasmuch as both the simple and the compound microscope must be used he should be shown how to use both to the best advantage. The simple microscope is much neglected. The compound microscope brings an entirely new set of experiences to the pupil and he needs to be taught how to interpret what he sees. When sections of larger objects are furnished him, the teacher should take care that he understands the position of the section with reference to the object from which it was cut. He should be taught by practice to interpret and combine sections so as to obtain a conception in three dimensions of structures seen in two. Drawing, and especially the making of clear diagrams, should be insisted upon, avoiding undue detail and repetition which consume time but illustrate no new structure or form. Well-made diagrams, with details carefully drawn in certain parts, are much more profitable than the most elaborate drawings without correct ideas behind them.

It is not contemplated that the student shall obtain a knowledge of Botany as a science, but that he shall know what plants are, how they work, and how they are related to the external world and to other living things. The objects to be kept in view should be: first, to impart to a student through his own observation and reading a conception of the extent and variety of the plant kingdom, relating the groups to one another by a thread of evolution; second, a conception of the ways in which plants "live and move and have their being," by exhibiting them as mechanisms with parts, each doing its own work, and all working together harmoniously because they are sensitive to changes in the surrounding world and because they have power to adapt themselves thereto; third, a conception of the social relations of plants to other plants and to animals, and of the way in which their distribution is determined by all the agents acting upon them. To the laboratory and field work there should be devoted not less than two, and preferably three, double periods per week. It should be accompanied by assigned readings in one or more modern texts, and quizzes, for which two or three single periods per week are needed. When only single periods are given to the course, it should be discretionary with colleges to accept such work as one-half unit.

The general aims and methods of botanical teaching are well set forth in Ganong's "Teaching Botanist," which is commended to the attention of teachers of botany. The teacher who is adequately prepared will be the best judge of the materials and the methods by which in his own school the foregoing objects can be attained. The following suggestions are made as an indication of the amount and character of the work desired. They disregard questions of order. It is especially desirable, for instance, that physiological and ecological work be taken up in connection with the study of the anatomy of the organs with which they are most intimately associated, or with the organisms exhibiting certain relations best; *e. g.*, sterilization and the economic relations of fungi should be presented when the fungi are under examination.

The synoptical view of the great natural groups of plants should be based upon a study of the structure, reproduction, and adaptations of types from each group. Where living material is not available, preserved material may be used. The evolutionary history of the great groups should be presented as far as it is known. Evolutionary principles may also be illustrated in a study of floral development. The alternation of generations should be traced from its clear development in bryophytes and pteridophytes backward to the hints of it among the algae and forward to its complete disappearance among the angiosperms. In the pteridophytes attention should be devoted to heterospory and to the consequent development of the seed habit in gymnosperms and angiosperms.

In general the simplicity of the lowest plants requires only brief study, and progressively more should be given to the higher and more conspicuous forms, until in the angiosperms detailed study is made of the various organs, and their functions. The following types are suggested, but should be changed to suit local conditions:

ALGAE: Pleurococcus, Nostoc, Spirogyra, Cladophora, Vaucheria, Fucus, Nemalion or Polysiphonia or Coleochæte.

FUNGI: Bacteria, Mucor, Yeast, Puccinia or a powdery mildew, Mushroom.

LICHENS: Physcia or Parmelia.

BRYOPHYTES: (Hepaticæ) Radula or Porella or Marchantia; (Musci) Mnium or Funaria or Polytrichum.

PTERIODPHYTES: Aspidium or equivalent, including the prothallus.

GYMNOSPERMS: Pinus.

ANGIOSPERMS: A monocotyledon and a dicotyledon. Examination of the structure and function of the following parts in any convenient species.

The seed: Three types (dicotyledon, one without and one with endosperm, and a monocotyledon); structure and homologous parts. Food supply, experimental determination of its nature. Phenomena of germination and growth of embryo into a seedling (including escape from the seed coats and development of parts).

The shoot: Gross anatomy of a foliage shoot, including the relationships of position of leaf, stem (and root), the arrangement of leaves and buds on the stem, and deviations (through light adjustment, etc.) from symmetry. Buds, and the mode or origin of new leaf and stem; winter buds in particular. Annual growth; shedding of bark and leaves.

Specialized shoots, including the flower. Comparative study of the parts and their functions in six or more different types, such as the ranunculaceaus, cruciferous, leguminous, convolvulaceous, labrate, composite, liliaceous, and gramineous types. In connection with the study of the flower students should be shown how to discover the names of unknown plants by use of analytic keys and descriptive floras. In general they should be introduced to unknown plants by name.

The root: Gross anatomy and general structure of a typical root; position and origin of secondary roots; hair-zone; cap and growing point.

Specialised roots of various sorts.

The fruit: Comparative study of several types of fruit (dry capsule, legume, nut) and fleshy (pome, berry, drupe, etc.), especially with reference to changes from the flower, and from ovule to seeds.

In connection with the study of anatomy the following physiological topics should be presented:

Rôle of water in the plant: Absorption (osmosis), path of transfer, transpiration, turgidity and its mechanical value, plasmolysis.

Phytosynthesis: Dependence of starch formation upon chlorophyll, light and carbon dioxid; evolution of oxygen.

Respiration: Necessity of oxygen for growth, evolution of carbon dioxid.

Digestion: Action of diastase on starch and of lipase on fats.

Irritability: Geotropism, heliotropism, etc.; nature of stimulus and response.

Growth: Localization and rate in higher plants.

The following ecological topics should receive attention either in connection with the foregoing laboratory work or in special field excursions, for which students should be furnished as careful directions as for laboratory work.

Adaptations of parts for special functions.

Dissemination.

Cross-pollination.

Light relations of green tissues; leaf mosaics.

Plant societies: Mesophytes, hydrophytes, halophytes, xerophytes, climbers, epiphytes, parasites and saprophytes. Plant associations and zonal distribution.

ZOOLOGY.

COMMITTEE.

J. Reighard (Chairman), Professor of Zoology, University of Michigan.

E. L. Moseley, Teacher of Science, High School, Sandusky, Ohio.

W. A. Locy, Professor of Zoology, Northwestern University.

F. L. Charles, Instructor in Biology, Northern State Normal School, DeKalb, Illinois.

H. D. Densmore, Professor of Botany, Beloit College.

L. Atherton, Head of Department of Biology, High School, Oshkosh, Wisconsin.

H. F. Nachtrieb, Professor of Animal Biology, University of Minnesota.

H. W. Norris, Professor of Zoology, Iowa College, Grinnell, Iowa.

J. A. Anderson, Head of Department of Biology, High School, Dubuque, Iowa.

L. E. Griffin, Professor of Biology, Missouri Valley College, Marshall, Missouri.

J. W. Scott, Teacher of Biology, Westport High School, Kansas City, Missouri.

Caroline E. Stringer, Head of Department of Biology, High School, Omaha, Nebraska.

A. Pihlblad, Professor of Biology, Bethany College, Lindsborg, Kansas.

C. E. Johnson, Teacher of Science, Sumner County High School, Wellington, Kansas.

C. P. Lommen, Professor of Biology, University of South Dakota.

G. D. A. Cockerell, Professor of Systematic Botany, University of Colorado.

A. E. Beardsley, Professor of Biology, State Normal School, Greeley, Colorado.

Definition (1 unit).

A high school course in Zoology should have for its objects: (1) To acquaint the student with the common animals of his own neighborhood, with the various environments of these animals, with the structural adaptations which the animals show to their environment and with their habits and economic importance. (2) To afford training in critical methods of making and recording observations both by drawing and by writing, both in the laboratory and in the field. (3) To teach enough of the interpretation of the observed facts that the student may understand the current methods of interpretation from the morphological, physiological, and ecological standpoints. In other words, with the study of the structures there should go an interpretation of their use (physiology, ecology) and of their past history (evolution). An elementary training in both experimental and comparative methods should be sought, and the peculiar value of such training as a means of intellectual development should not be overlooked. Ability on the part of the student to observe and think independently is especially desired.

For a course extending through the year with four periods per week, it is recommended that the laboratory and field work consist of the study of at least ten type forms to be selected from the following lists:

1. An insect.
2. The crayfish.
3. An earthworm, leech, or fresh water oligochaete.
4. An Amoeba or other protozoan.
5. Hydra or a hydroid.
6. A mussel or snail.
7. A fish.
8. A frog, or turtle.
9. A bird.
10. A mammal.

The animal to be taken as the type under each head may be selected by the teacher and will vary with the locality. It will usually be most convenient to begin with insects in the fall and to take up birds before the spring migration and mammals later in the spring. The order in which the other forms are taken up may vary according to convenience. In the above list the crayfish and the earthworm have been placed after the insect in order to bring like forms together. Those who find difficulty in beginning with a form as small as the grasshopper may prefer to spend the first two weeks on the crayfish, but any considerable delay in taking up insects in the fall should be avoided. The other forms are arranged in the usually accepted logical order which is preferred by most teachers. If, for practical reasons, it is deemed best to depart from this order, it will be found that the idea of evolution may be taught with quite as much force from material within the individual groups as by an adherence to the so-called logical order of the groups themselves.

If time permits the teacher may profitably add to the list of types an echinoderm and a sponge, to each of which one or two classes and laboratory periods may be devoted. The student's conception of the animal kingdom is thus greatly broadened.

A suitable laboratory and field equipment is assumed. Its precise character will vary with circumstances. In general the better the equipment the better the work that may be done. While it is true that a course in zoology may be given without the use of the compound microscope, in the opinion of your committee a much better course may be given by its moderate use.

As far as possible the work on each type should be begun by collecting by the students, chiefly of the type form but incidentally of as many as possible of other forms belonging to the same group. Some of the animals collected

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A fish.
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). A bird.
). A mammal.

taxonomy should be taught, nevertheless individual students who show an aptitude for it should be provided with literature and should receive every encouragement from the teacher to carry on voluntary work in collecting and classifying animals.

4. *Ecology*: Animal ecology includes not only a study of the habits of animals referred to but also a study of the relations of animals to their environment. This branch of zoology, which must be in part carried on in the field, attempts to determine how animals maintain themselves in their environment and why animals in a given environment give place to others when the physical and other characteristics of the environment are altered. Few teachers are prepared to include this subject in their teaching, but attention should be called to the importance of the subject as a constituent part of a high school course in zoology and teachers should prepare themselves to do work of this sort. The amount of such work that may be done in elementary classes is indicated in the specific illustration which follows.

The plan recommended for laboratory and field work may be best made clear by a specific illustration. Thus the work on insects may be begun with the grasshopper with a collecting trip in which each individual student is required to bring into the laboratory as many kinds of grasshoppers as he can obtain, and together with these a certain number of insects belonging to other groups. Each student should then preserve most of the insects in his collection and after sorting them put them aside for future use. In this connection instruction may be given in methods of pinning and preserving insects and encouragement may be given the pupil to make his own collection. Many of the grasshoppers collected should be kept alive and their study now be undertaken. In this study function and structure should, as far as possible be considered in connection with one another. Thus the student may observe the ways of walking, hopping, and flying, and in connection with these may study on preserved material the structure of the legs and wings. At the same time he may be instructed in the class room and by the aid of models, preparations and diagrams concerning muscles and the movements produced by them. Similarly he may study the use of the mouth parts in feeding and may then observe the structure of the mouth parts in greater detail. From this he may proceed to a study of the structure of the digestive organs either from his own dissections or from preparations and charts. The teacher may then give them elementary instruction concerning the process of digestion. Again observations may be made on the breathing movements to be followed by an anatomical study of the spiracles and tracheae and an exposition of the nature of respiration. Thus in all cases, so far as practicable, close correlation should be made between the work on the function and that on the structure of the various parts of the body.

The work in which the student can actually see the working of the part observed will of course have to be followed by a study of the parts whose function is not so obvious, but the same principle of correlating structure and function may be followed throughout. It is advisable that the work in which the teacher supplies most of the physiological instruction should follow that in which the pupil is able to make his own observations.

The class should next make a comparative study of the different grasshoppers collected so as to be able to distinguish the different species in a second field excursion. When a good conception has been gained of the general structure of the body and of the chief functions of its part, and when a sight recognition of the local species of grasshoppers is assured, attention may be directed to the life of grasshoppers in the field and to the adaptations shown by the various species to their conditions of existence (ecology). To give an illustration of the nature of the ecological work that may be undertaken advantageously in the high school we may cite the following observations which may easily be made upon the grasshoppers which occur in nearly every neighborhood. The kind of situation should be noted in which each species occurs. The students should observe the relation between these habitats and the species found in them. The instinct of the roadside grasshopper to alight in barren spots of ground and of various species of green coloration to alight on grass stems and to keep on the side opposite the observer. The instinct of other species when alighting in the grass to drop down and remain quiet next the ground. These and many other features of behavior which show a marked adaptation to particular kinds of environment can easily be observed and interpreted. If the teacher directs the attention of the students to such phenomena and by carefully planned questions leads them to make and to record observations of their own, work cannot fail to prove of interest and value. Such work, if properly planned, can be controlled as well as tasks performed in the laboratory.

When the field work on the grasshopper has been completed the class should take up the insects on the first field excursion and should become familiar with the principal groups of insects. At this point attention may be directed to the economic value of certain species. Here, again, opportunity will be afforded to stimulate individual work and the making of collections.

The same plan of work may be followed in considerable detail with the mollusca. In the case of other groups the field work may need to be considerably modified. Thus birds and mammals may not be collected but both may be studied in the field. Protozoa and hydra may be collected but are not, of course, suitable for field study. In the case of each type the plan outlined should be followed in so far as the nature of the material permits. It is believed that in the laboratory the plan is feasible in nearly every case.

Both laboratory and field work is best carried on by means of written or printed directions prepared by the teacher. Just before each field excursion the teacher should visit the locality selected for the field work in order to be assured that the desired material is available and that the observations outlined are feasible.

The class room instruction should co-ordinate and extend the work done in the laboratory and further interpret it. It is believed that the further work carried on in the class room may be best done by means of topics to be studied in connection with those laboratory types which best illustrate them. Thus in connection with insects protective coloring and mimickry, as well as the general subject of metamorphosis, may be enforced and illustrated. In connection with the frog the development should be studied in the laboratory and general notions of development added to those of metamorphosis. In connection with mollusca variation and the ideas of species may be enforced. Instinct and intelligence may properly be considered in connection with several of the types. Toward the end of the course time should be left for a connected presentation of the doctrine of evolution and of natural selection.

The importance of proper field and laboratory notes and drawings should be emphasized. Notes, both in field and laboratory should be made while the work is in progress, not afterward. They should be criticized by the teacher with reference to their pertinence and completeness and should be permanently preserved. Such notes may be made the basis of more careful reports which should be criticized with a reference to the arrangement of their contents, the character of their conclusions and their English. It is suggested that teachers of English will often be found will-ing to co-operate in the correction of such reports. Drawing is of no less importance than note taking. Drawings should be made chiefly in the laboratory and always from the specimen. It should be the object of the teacher to see that the drawings are accurate and that their details have meaning. Meaningless or ambiguous lines or masses of shade have no more place in a scientific drawing than meaningless words in a sentence.

Attention should also be called to the importance of local school museums. These should contain primarily representatives of the local fauna attractively displayed. Students may be referred to specimens in such a museum as they are referred to books and may use the museum as they would a library. The Michigan Academy of Sciences maintains a bureau the purpose of which is to secure for teachers and others the identification of specimens collected by them and their exchange for other specimens. Information concerning the bureau may be had from the Secretary of the Academy, Professor Charles E. Marshall, Agricultural College, Mich.

The following recommendations are also made:

1. That the course be put in the second high school year, rather than in the first, and that it be preceded by a course in physiography. Such an arrangement should greatly help the teaching of field ecology.

2. Each week's work should consist of two class exercises and at least two laboratory exercises. Each laboratory exercise should consist of at least two school periods, and these should if possible be the last two periods of the afternoon. By this arrangement it will be possible to use the greater part of the afternoon for field excursion.

3. Where but half a year's work is offered in zoology the teacher should select the groups to be studied. Since the groups do not require equal periods of time, the number

to be studied in a half year's course will depend on the selection. It should not be less than five.

4. Where but a half year's work is offered in zoology, and where at the same time human physiology is taught the zoology should be followed at once by the physiology or the two subjects should be combined into a single course. It is believed that time will be saved by this arrangement and that interest will be added to both subjects.

COMMERCIAL SUBJECTS.

COMMITTEE.

E. V. Robinson (Chairman), Professor of Economics and Politics, University of Minnesota.

F. C. Hicks, Professor of Economics and Civics, University of Cincinnati.

D. Kinley, Dean of Graduate School, Director of Courses in Commerce, Professor of Economics, University of Illinois.

H. E. Brown, Principal, High School, Rock Island, Illinois.

M. M. Beddall, Principal, High School, Boone, Iowa.

I. A. Loos, Professor of Political Economy, State University of Iowa.

M. S. Wildman, Assistant Professor of Economics, University of Missouri.

P. B. S. Peters, Director of Business Course, Manual Training High School, Kansas City, Missouri.

G. A. Gregory, Superintendent of Schools, Crete, Nebraska.

N. M. Graham, Principal, High School, South Omaha, Nebraska.

D. T. Walker, President, Watertown Commercial College, Watertown, South Dakota.

B. O. Aylesworth, President, State Agricultural College, Fort Collins, Colorado.

J. A. Hutchinson, Teacher of Commercial Branches, West Side High School, Denver, Colorado.

Definitions (7 units).

Business Arithmetic (½ unit).

The object is first of all absolute accuracy, and secondly speed, in ordinary business computations. To secure these essentials, not less than half of each recitation should be devoted to mental drill on simple exercises. For the same reason, no credit whatever should be allowed on work involving any error in computation; and a rigid time limit should be set for all written work.

As to subject matter, complicated methods and obsolete subjects should be eliminated. This means cutting out about half of what the books contain. The topics to be ***emphasized*** are: (1) the fundamental operations with integers; (2) common fractions having as denominators 2, 3, 4, 6, 8, 12, or 16, and small decimals; (3) a few common weights and measures, but not the mass of uncommon ones, nor a mixture of denominations (e. g. no merchant sells cloth by yards, feet and inches, but by yards and fractions thereof); (4) percentage and its more important applications, especially interest and discount; (5) short methods, especially thorough drill in the use of interest and other calculation tables.

Text book, supplemented by numerous live exercises from current sources, such as stores, trade papers, etc. The methods should be planned so as to arouse and sustain interest. "The class work must touch life and breathe the spirit of business."

Elementary Bookkeeping (1 unit).

The technical business subjects, especially bookkeeping and stenography are vocational in purpose and must therefore be taught with a view to practical mastery. This fact should suggest and control the method. For example, no credit whatever should be allowed unless the work is done neatly, accurately, and at a satisfactory rate of speed. And there should be a combination of class and individual methods of instruction to secure maximum results. In order to establish sound habits, it is also well to provide double periods for elementary bookkeeping, and require all work to be done in the class room under the eye of the instructor.

The first requisite is a good, clear business handwriting. Unless pupils have it, which they rarely do, they should be required to do a prescribed amount of practice writing under the supervision of the instructor.

Definitions of double entry terms, with rules for debit and credit, kinds and uses of books. Conduct of a set including the journal, cash book, sales book ledger, check book, bank pass book and trial balance book, closing of books. Single entry set: changing from single to double entry.

Text book, with exercises so arranged that no two pupils will do exactly the same work.

Advanced Bookkeeping and Business Usage (1 unit).

Thorough drill on the preparation and interpretation of standard business forms, such as bills, receipts, checks, notes, time and sight drafts, acceptances, endorsements, invoices, accounts sales, deposit tickets, warehouse receipts, express receipts, bills of lading, statements of account, balance sheets, etc.

Explanation of business symbols and abbreviations.

Bill book, invoice book, special books, loose leaf and voucher systems of bookkeeping.

Each student is to carry on a business of his own, manufacturing, banking, wholesale, retail, jobbing or commission: at first as an individual, then as a partnership, finally as a corporation, thus involving the use of several forms of accounts.

Credit on this course should mean that the school is ready to vouch for the student as one thoroughly versed in the principles and practice of bookkeeping, who lacks only actual business experience to become a competent bookkeeper.

Business Law (½ unit).

The object of this study is not to make "every man his own lawyer," but rather to enable him to keep out of legal complications. For ignorance of the law excuses no one.

To this end, it is necessary to study the legal principles governing business relations, especially contracts, their nature, essentials, and effects; further sales, interest and usury, bills and notes, agency, partnership, corporations, real property and mortgages, liens, attachments, surety and guarantyship, bailments, common carrier, banking, fire insurance, landlord and tenant.

Text book, supplemented by some study of cases (by way of illustration), discussions, and practice in drawing legal papers such as a contract, note, bill of exchange, bill of sale, bill of lading, power of attorney, deed, mortgage, lease, notice of protest, etc.

Stenography and Typewriting (2 units).

This work is expected to occupy not less than two periods daily for two years. No credit should be given for either shorthand or typewriting if taken alone.

The "touch" method is strongly recommended in typewriting.

The object is first, accuracy, and second, speed in taking dictation and transcribing notes. Equally essential are correct spelling, capitalization, punctuation and paragraphing.

No credit should be given unless the following speed is attained: at end of first year, 75 words per minute in dictation and 25 words per minute on the machine; at end of second year, 500 words in 5 minutes in dictation, and 35 words per minute in the transcription of notes.

Thorough training should also be given in care of the machine, and in methods of copying, manifolding and filing papers.

Business Spelling and Correspondence (½ unit).

Preliminary review of 500 common business words. Thorough drill on business correspondence including:

(1) Form of business letters, beginnings and endings, etc.

(2) Choice of words and structure of sentences with reference to clearness and brevity.

(3) Capitalization, punctuation and paragraphing.

(4) Writing and answering telegrams and advertisements.

If the pupil does not write a clear and neat business hand, he should be required to make good his deficiency, or no credit should be granted for the course.

Text book, supplemented by letters relating to the most prominent industries of the locality.

History of Commerce (½ unit).

Knowledge of the past is indispensable to an understanding of the present. The History of Commerce thus forms the natural introduction to the study of present economic conditions. It should, however, follow the usual courses in Ancient, Medieval and Modern History.

The principal commodities, centers and routes of commerce in successive ages. Relation to stage of economic development, division of labor, means of transportation and communication, markets and fairs, their functions in commerce. Special attention to England and the United States; and to the growth of modern colonial empires.

Text book, supplemented by map work and assigned readings.

Economic History of England (½ unit).

A study of English history with special reference to the causes and effects of her economic development. It should be based on some of the smaller economic histories such as Cheyney, Price, or Cunningham and McArthur.

This course, where given, will naturally follow the courses in general European history, and may take the place of the usual political English history.

Economic History of the United States (½ unit).

A study of American history with special attention to the economic factor. It should be based on some text book such as Wright, Coman or Bogart and supplemented by collateral reading, especially in books such as Semple and Brigham on geographic influences.

This course will naturally follow the one on English history and may take the place of the usual political American history.

Materials of Commerce (½ unit).

A study of the most important food stuffs and raw materials which enter extensively into commerce, with special reference to their source, mode of preparation and principal uses.

A course introductory to commercial geography. Text book, study of specimens and pictures, collateral reading, visits of inspection. The introduction of this subject is not recommended unless samples can be provided of at least two dozen of the chief commercial staples in various stages of preparation.

Commercial Geography (½ unit).

As the history of commerce is concerned with the past of commerce, so commercial geography describes and seeks to explain the industry and commerce of nations to-day. It is "a comparative study of the nations of the world, their commercial prominence and their contest for the trade of the world."

The introductory work should cover: (1) the effect of surface, soil, climate, etc., that is, the physical factor in commerce; (2) the influence of race, religion, education, commercial policies, etc., that is, the human factor in commerce; (3) the effect of economic forces on production and commerce; (4) means of transportation and communication.

Following this should come a detailed study of the United States by sections and then as a whole, with reference to physical features, and climate, natural resources, population, leading industries, transportation facilities and commerce, especially foreign commerce; then a study of the outlying possessions of the United States; and finally, a survey of the other important commercial countries from the same viewpoint.

Text book, supplemented by map work and assigned readings. For purposes of illustration, samples of commercial staples, lantern slides, stereopticon pictures, etc., should be freely employed; and wherever possible, visits of inspection made and informal lectures secured by experts in various industries. Should be preceded by physical geography.

Elementary Economics (½ unit).

The study of Economics is indispensable if the business man is to understand the process in which he has a part, and the tendencies which are at work in the business world of to-day.

In the high school, it is necessary to avoid two extremes: the one, abstract theory; the other, controversial questions. While not omitting theory, emphasis should therefore be placed on historical and descriptive matter.

Text book, with collateral readings, especially on the economic history of England and the United States. In the selection of texts it is well to avoid large and difficult books intended for college classes.

MANUAL TRAINING.

COMMITTEE.

C. M. Woodward (Chairman), Dean of School of Engineering and Architecture, Washington University, St. Louis.

T. K. Lewis, Assistant Professor of Engineering Drawing, Ohio State University.

J. W. Carr, Superintendent of Instruction, Dayton, Ohio.

G. N. Carman, Director, Lewis Institute, Chicago, Illinois.

C. A. Bennett, Professor of Manual Arts, Bradley Polytechnic Institute, Peoria, Illinois.

J. D. Phillips, Professor of Drawing, University of Wisconsin.

J. J. Flather, Professor of Mechanical Engineering, University of Minnesota.

G. F. Weitbrecht, Principal, Mechanic Arts High School, St. Paul, Minnesota

A. C. Newell, Supervisor of Manual Training, West Des Moines, Iowa.

C. H. Bailey, Director of Manual Training, Iowa State Normal School, Cedar Falls, Iowa.

C. R. Richards, Professor of Mechanical Engineering, University of Nebraska.

W. M. Davidson, Superintendent of Instruction, Omaha, Nebraska.

A. A. McDonald, High School, Sioux Falls, South Dakota.

V. C. Alderson, President, State School of Mines, Golden, Colorado.

C. A. Bradley, Principal, Manual Training High School, Denver, Colorado.

Definitions (10 units).

MANUAL TRAINING COMPRISES A SYSTEMATIC STUDY OF THE MANUAL ARTS, EMBRACING (1) THE MECHANIC ARTS, (SHOPWORK, DRAWING); (2) HOUSEHOLD ARTS, (SEWING, COOKING).

The minimum time given per year in order to count as a unit should not be less than the equivalent of 240 hours of 60 minutes. No superior limit is given, but additional hours should not receive additional credit.

Shopwork (4 units).

Every exercise which is involved in what follows should be planned and executed to illustrate an important mechanical principle or process, or a combination of such principles and processes.

The exposition of a tool and the demonstration of a process should be before the entire section of pupils conveniently seated so as to see all that the teacher does, and hear all that he says.

The shop-period of first-year boys ought not to exceed 100 minutes in length; but third and fourth-year pupils can profitably have longer, but less frequent shop-periods; however, those periods should never exceed 180 minutes.

Pupils should never be left to find out for themselves the proper ways of using a tool. The correct ways should be clearly and fully shown and explained. The use of a wrong tool, and the adoption of an illogical or unscientific procedure should at once be checked, and the error should be plainly pointed out.

Bench Work (1 unit).

(a) Fundamental tool processes: Measuring, squaring, gauging, sawing, boring, chiseling; rules for planing.

(b) Constructions involving groove joints and halving; laying out and cutting joints; use of nails, screws and glue; carving and finishing.

(c) Making a glue joint; planing joints, gluing, clamping, surfacing, sandpapering.

(d) Construction by means of mortise-and-tenon joint; laying out duplicate parts, cutting mortise, sawing tenon, gluing and clamping, scraping, finishing.

(e) Construction involving the miter joint; planing parallel edges and sides in the construction of a miter box; rebating, laying out and cutting a brace.

(f) Dovetailing: laying out and cutting dovetails, planing corners, inlaying.

(g) Construction involving the use of the panel: plowing, fitting, gluing, clamping, putting on hinges, finishing.

2. *Wood-Turning and Elementary Metal-Working* (1 unit).

(1) Wood-turning. Use of different kinds of wood. Care of lathe.

(a) Turning spindle, cylinder, taper, convex curve, concave curve, compound curve; turning to given dimensions. finishing and polishing in the lathe.

(b) Faceplate turning.

(c) Chuck turning; built-up stock, fitting.

(2) Metalworking. Working in a variety of metals, including cast-iron, steel, brass, tin, zinc, and copper.

(a) Chipping and Filing; chipping with cold chisel and hammer; filing, testing, tool dressing.

(b) Making small tools. Drilling, filing, fitting, riveting, finishing.

(c) Construction in sheet metal; pattern cutting, bending, folding, wiring, soldering.

(d) Copper work: sawing, beating, hard soldering, repoussé, annealing, coloring with heat and chemicals, etching.

(e) Turning: Hand-tool turning, filing in lathe, polishing in lathe, thread cutting with top and die, hardening, tempering, annealing.

(f) Spinning: cutting templet, turning form in wood to fit templet, spinning zinc or Britannia metal and copper, polishing, lacquering.

3. *Pattern Making, Molding and Forging* (1 unit).

The theory and use of patterns, how built, how divided and why; pattern-making, bench-molding of simple and complex patterns; theory and use of cores, construction of cores and core-prints; casting with lead and alloys.

Construction and management of the forge—fundamental processes; drawing, up-setting, bending, punching, splitting, welding, hardening; shaping steel under the hammer; tempering of different grades; the construction of chains, hooks and forge tools, and wrought-iron articles from original or selected designs; finally the manufacture of a set of standard steel lathe tools. The design and actual construction of a piece of ornamental wrought-iron or steel work.

4. *Bench and Machine Metal Fitting* (1 unit).

Theory of metal-turning, centering; forms of cutting tools and tool-grinding; turning cast-iron, wrought-iron, steel, and brass; use of oil, relation of speed to heat developed; use of taps and dies; screw cutting, chuck-work, mandril and face-plate work; drilling, slotting, planing, gear-cutting, and special work on the milling machine. Having mastered the elements, each student should combine more or less of such elements in a construction, made in accordance with original or selected drawings.

Drawing (2 units).

1. (a) Straight lines; use of T-square, triangles, pencil, ruling pen, dividers, and scale. Conventional lines. Freehand working sketches.

(b) Circles. Use of compasses, center lines, cross-hatching.

(c) Tangents. Location of centers and points of tangency.

(d) Planes of projection; elementary principles of projection; revolution of the planes of projection. Projections of simple geometric figures.

(e) Revolution of objects. "Views" of objects in simple and inclined positions.

(f) Developments: prism, cylinder, pyramid, cone.

(g) Intersections. Axes in the same plane, axes in different planes.

(h) Isometric and cabinet drawing.

(i) Freehand and mechanical lettering; placing, form, slant, spacing, stroke.

(j) Working drawings; furniture.

(k) Working drawings; machine parts.

(l) Building plans; floor plans, elevations.

2. (a) Mechanical perspective.

(b) Freehand drawing in perspective.

(c) Construction of conic sections and helix.

(d) Line shading.

(e) Wash drawing.

(f) Designing for metal work.

(g) Either machine or architectural drawing.

Household Arts and Science (4 units).

1. *Plain Sewing* (1 unit).

Every exercise in sewing should illustrate an important principle or process, or a simple combination of such principles and processes. Hand sewing and sewing machine work must be equally insisted upon.

(a) The various stitches and their special uses.

(b) Hand sewing, fundamental processes.

(c) The use and care of sewing machines and their attachments.

(d) The nature and special uses of cotton, linen, and woolen goods.

(e) The use of patterns; cutting out.

(f) Taking measurements; making of simple garments.

2. *Sewing and Millinery* (1 unit).

(a) Making of shirt waists, wash-dresses, and similar garments.

(b) Millinery: Study of materials for hats; making, altering, and covering hat frames. The planning, making, and trimming of seasonable hats of appropriate materials.

Throughout the course economy and good taste in dress.

Cooking (2 units).

1. Food classified and tested for food principles.

A study of the effect of heat upon foods alone and in combination; experiments with leavening agents, and their uses shown in actual cooking. Bread making. The theory and practice of canning and preserving fruits, vegetables, and meats. Planning, cooking, and serving meals. Waiting on table.

2. The cost of food; market prices; the cost of meals. Household accounts. The family dietary: The planning, weighing, and cooking of apportioned meals. Diets for infants, invalids, and convalescents.

Sanitation: Selection of site, house planning; heating, lighting, and ventilating; water supply; disposal of waste; furnishing and decorating; cleaning processes, including laundry work.

BOARD OF INSPECTORS.

Whitney, A. S. (Chairman), University of Michigan.
Alton, G. B., State of Minnesota.
Ballou, F. W., University of Cincinnati.
Boyd, W. W., University of Ohio.
Butler, Nathaniel, University of Chicago.
Elliff, J. D., University of Missouri.
Ensign, F. C., University of Iowa.
Heyward, Richard, State of North Dakota.
Holland, E. O., University of Illinois.
Hollister, H. A., University of Illinois.
Johnson, W. H., University of Kansas.
Libby, Walter, Northwestern University.
Reed, A. A., University of Nebraska.
Swanson, C. E., State of South Dakota.
Terry, H. L., State of Wisconsin.
Thompson, Frank E., University of Colorado.
Tressler, A. W., University of Wisconsin.

STANDARDS OF ADMISSION

The aim of the North Central Association of Colleges and Secondary Schools is, first, to bring about a better acquaintance, a keener sympathy and a heartier coöperation between the Colleges and Secondary Schools of this territory; secondly, to consider common educational problems and to devise best ways and means of solving them; and thirdly, to promote the physical, intellectual and moral well being of students by urging proper sanitary conditions of school buildings, adequate library and laboratory facilities, and higher standards of scholarship and of remuneration of teachers. The Association is voluntary, organized and devoted solely to the highest welfare of the boys and girls of this territory, and it bespeaks the cordial and sympathetic support of all school men.

The following constitute the standards of admission to this Association for the present year:

1. No school shall be accredited which does not require fifteen units, as defined by the Association, for graduation.

2. The minimum scholastic attainment of all high school teachers shall be equivalent to graduation from a college belonging to the North Central Association of Colleges and Secondary Schools, including special training in the subjects they teach, although such requirements shall not be construed as retroactive.

3. The number of daily periods of class-room instruction given by any one teacher should not exceed five, each to extend over at least forty minutes

in the clear. (While the Association advises five periods, the Board of Inspectors will reject all schools having more than six recitation periods per day for any teacher.)

4. The laboratory and library facilities shall be adequate to the needs of instruction in the subjects taught as outlined by the Association.

5. The location and construction of the buildings, the lighting, heating, and ventilation of the rooms, the nature of the lavatories, corridors, closets, water supply, school furniture, apparatus, and methods of cleaning shall be such as to insure hygienic conditions for both pupils and teachers.

6. The efficiency of instruction, the acquired habits of thought and study, the general intellectual and moral tone of a school are paramount factors, and therefore only schools which rank well in these particulars, as evidenced by rigid, thorough-going, sympathetic inspection, shall be considered eligible for the list.

7. Wherever there is reasonable doubt concerning the efficiency of a school, the Association will accept that doubt as ground sufficient to justify rejection.

8. The Association will decline to consider any school whose teaching force consists of fewer than four teachers exclusive of the Superintendent.

9. No school shall be considered unless the regular annual blank furnished for the purpose shall have been filled out and placed on file with the inspector.

10. All schools whose records show an abnormal number of pupils per teacher, as based on average number belonging, even though they may technically meet all other requirements, are rejected. The Association recognizes thirty as maximum.

11. The time for which schools are accredited shall be limited to one year, dating from the time of the adoption of the list by the Association.

12. The organ of communication between the accredited schools and the Secretary of the Commission for the purpose of distributing, collecting, and filing the annual reports of such schools and for such other purposes as the Association may direct, is as follows:

a. In states having such an official, the Inspector of Schools appointed by the state university. b. In other states the Inspector of Schools appointed by state authority, or, if there be no such official, such person or persons as the Secretary of the Commission may select.

The Association is very conservative, believing that such action will eventually work to the highest interests of the schools and the Association. It aims to accredit only those schools which possess organization, teaching force, standards of scholarship, equipment, esprit de corps, etc., of such character as will unhesitatingly commend them to any educator, college or university in the North Central territory.